

**NOAA
FISHERIES**

**Northeast
Fisheries
Science Center**

Management Objectives and Performance Metrics

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Ecosystem Based Fishery Management Strategy Review
April 30- May 2 2018 Woods Hole, MA

TOR 4 Comment on applicability and utility of management objectives and
performance metrics used in development of operating models

The Nature
Conservancy 

Goal

To protect the ecological integrity of US marine resources as a sustainable source of wealth and well-being for current and future generations

Optimum Yield

Optimum yield is defined as “the amount of fish that

- will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems,
- is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor, and
- in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery”



Some Key Definitions:

A stock is defined as:

- “Species, sub-species, geographical grouping, or other category of fish capable of management as a unit”.

A fishery is defined as:

- “One or more stocks of fish which can be treated as a unit for purposes of conservation and management and which are identified on the basis of geographic, scientific, technical, recreational, and economic characteristics”
- Fishing for such stocks”



National Standard 1 – Optimum Yield

Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

National Standard 2 – Scientific Information

Conservation and management measures shall be based upon the best scientific information

National Standard 3 – Management Units

To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

National Standard 4 – Allocations

Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (a) fair and equitable to all such fishermen; (b) reasonably calculated to promote conservation; and (c) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privilege.

National Standard 5 – Efficiency

Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

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How do the new National Standard 1 (NS1) guidelines advance ecosystem-based fisheries management (EBFM)?

- NOAA Fisheries explicitly supports the incorporation of EBFM
- EBFM is consistent with the new NS1 guidelines.
- NS1 guidelines allows Councils to take into account multi-species interactions
 - e.g. Allow using an aggregate approach to estimating the maximum sustainable yield of a fishery.

<https://www.fisheries.noaa.gov/insight/frequent-questions-national-standard-1-final-rule>

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Optimize over a range of objectives including:

- Food Provision through targeted fishing and fishing for species for bait
- Employment
- Recreational Opportunity
- Intrinsic (Existence) values
- Profitability
- Promote stability in both the biological and social systems



Objectives - Strategic

Strawman objectives developed to run preliminary tests on the FEP

- directly linked to performance metrics that we will present

- The Council has not formally adopted the objectives
- nor have we engaged with stakeholders to develop the objectives at this stage.

Strategic Objectives

1. Maintain/restore sustainable production levels (ecosystem, functional group emphasis)
2. Maintain/restore biomass levels (functional group/species scale emphasis)
3. Maintain/restore functional trophic structure

Objectives - Operational

- Ecosystem and community/aggregate fishing mortality and or total catch is below established dynamic threshold

Phrased as probability according to risk policy

Specified for each spatial scale and time unit

Dynamic to account for environmental/climate shifts

“GB EPU total catch has less than 40% probability of exceeding the total catch limit between 2018-2020 ”

Objectives - Operational

- Fishing-related mortality for threatened/endangered/protected species is minimized (could establish caps if desired)
- Managed and protected species biomass is above established minimum threshold

Phrased as probability according to risk policy

Specified for each spatial scale and time unit

Dynamic to account for environmental/climate shifts

“GB haddock biomass has less than 40% probability of dropping below minimum B threshold between 2018-2020 ”



Objectives - Operational

- Maintain ecosystem structure within historical variation, recognizing inherent dynamic properties of the system; Ecosystem structure includes size structure, trophic structure, and functional group structure.

Maintain size structure within acceptable limits; e.g. *The large fish indicator within defined limits

Maintain trophic structure within acceptable limits; e.g.

*Marine trophic index of the community (MTI) within defined limits

*Mean trophic level of the community within defined limits

*Mean trophic level of the modelled community within defined limits

Maintain functional group/species complex structure within acceptable limits; e.g.

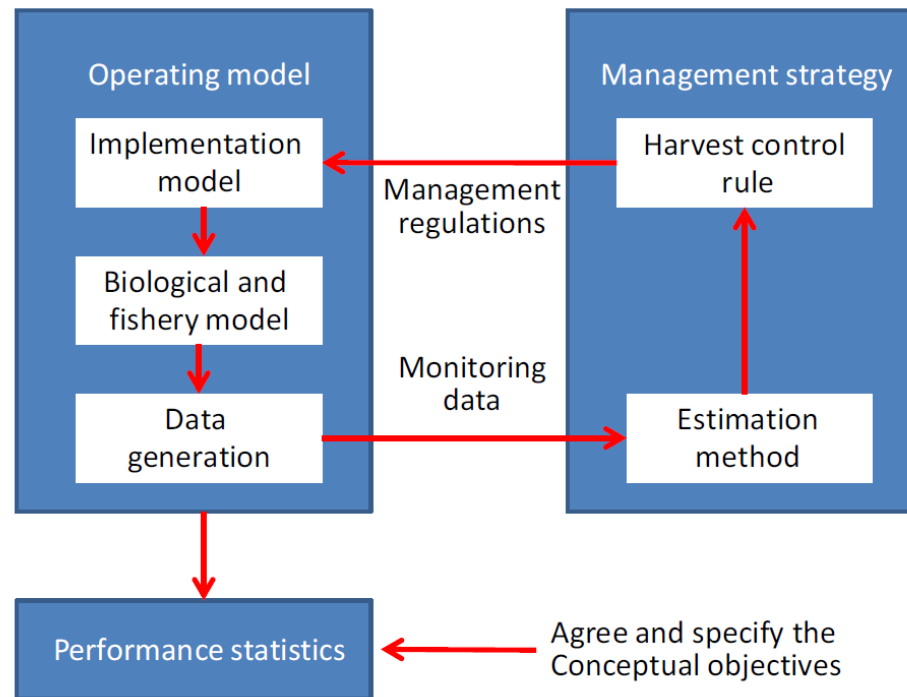
*Functional Group/species complex biomass across ecosystem components within defined limits



Objectives - Operational

- Maintain habitat productivity and diversity
- Habitat structure and function are maintained for exploited species
- Minimize the risk of permanent (>20 years) impacts; e.g.
 - Corals and sponges
 - Other vulnerable biogenic habitats
 - Coastal habitats vulnerable to Aquatic Invasive Species (AIS)
 - Vulnerable physical habitats (e.g. relict glacial gravel banks)

Management Strategy Evaluation (MSE)

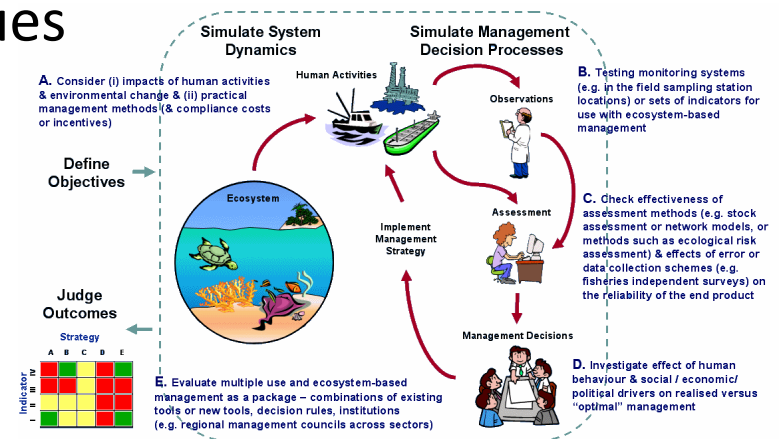


Punt et al 2016

Management Strategy Evaluation (MSE)

Components

- Spatial domain [Ecological Production Unit (EPU)]
- Identify Fishery Species Complexes (trophic interactions and fishing gear)
- Ecosystem and stock threshold values
- Management strategy evaluation



CSIRO

Indicators/performance metrics

- Functional Group Status (Proportion overfished/depleted)
- Species Status (Proportion overfished/depleted)
- Landings
- Biomass at Species and Functional Group Levels
- Stability of Landings
- Large Fish Index (Population)
- Large Fish Index (Landings)
- Revenue



Conclusion

- Magnuson–Stevens Act – EBFM is viable
- Strawman Objectives
 - State of the ecosystem
 - State of the functional groups
 - State of the individual stocks/species
- Performance metrics to assess utility

